

Appendix C

“BENEFIT-COST ANALYSIS: ITS RELEVANCE TO PUBLIC INVESTMENT DECISIONS”

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Benefit-Cost Analysis Its Relevance to Public Investment Decisions

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The U.S. government has for some time used benefit-cost analysis in the design and justification of dams and other water resources improvements. Currently the government is trying to adapt the technique to other public investment programs. At the request of the Bureau of the Budget, The Brookings Institution held a major conference on the topic in November 1963, with papers on applying benefit-cost analysis to urban highways, urban renewal, outdoor recreation, civil aviation, government research and development, and public health [ref. 1]. In 1965 the Bureau of the Budget established a special unit to adapt and apply benefit-cost and cost-effectiveness studies to a broad range of government programs. It is appropriate, therefore, to examine and evaluate this important branch of welfare economics.

WHAT IS THE PROBLEM?

The major limitation of benefit-cost analysis, as it has been applied to public investments in the United States, is that it ranks projects and programs in terms only of economic efficiency. (At the national level this

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means that projects and programs are judged by the amount that they increase the national product.) But the objective of most public programs is not simply, not even principally, economic efficiency. The redistribution of income to classes or to regions is an important objective in government plans-witness the Appalachia program. And there are other objectives, too-the promotion of national self-sufficiency, for example.

In other words, the objective functions of most government programs are complex; yet benefit-cost analysis has been adapted to only a single objective-economic efficiency. Thus, benefit-cost analysis may be largely irrelevant, or relevant to only a small part of the problem of evaluating public projects and programs. We should not settle for the current state of benefit-cost analysis, but rather find ways to make it applicable to the real issues of public investment.

Now, in all complex objective functions for government programs, economic efficiency will be one term. A second will frequently be income redistribution, as has been noted-to classes (the poor) or to regions (depressed areas). These two objectives may be complementary in some ways: a program designed to transfer income from the rest of the nation to Appalachia, or from the wealthy to the poor, may also increase national product? But a government program that maximizes efficiency will not necessarily, indeed is not likely to, achieve a specified high level of income redistribution. Thus, a planner who is responsible for developing a program or project for both purposes will need to know the relative weights to assign to efficiency and income redistribution.

Assume that the problem is to design an irrigation project on an Indian reservation so as to increase the income of the Indians as a group and to increase food production for the nation as a whole. The relation between income for the Indians (income redistribution) and food production (national economic efficiency) in this case can be stated in any one of three ways as follows. The example is based on Marglin [ref. 3]:

- 1) Maximize net income to the Indians, subject to a constraint that the ratio of efficiency benefits to efficiency costs is at least 1.0 to 1.0, or 0.9 to 1.0, or some other.
- 2) Maximize net benefits from food production in national terms-i.e., economic efficiency-subject to a constraint that the Indians net \$X thousand/yr.
- 3) Maximize a weighted sum of net benefits from economic efficiency

¹ For conditions under which regional redistribution in the United States can be achieved without significant loss in economic efficiency, see Mera [ref. 2]. For a more general statement of the relationship between economic efficiency and income distribution, see Marglin's discussion on "Objectives of Water Resource Development: A General Statement" [ref. 3, ch. 2, pp. 63-67].

and income redistribution in which \$1 of income to the Indians is valued at $$(1 + X)$ of efficiency. (In this case the X can be called a shadow premium on redistribution benefits.)

With proper values these three statements will be equivalent. Any constraint can be converted into a shadow price and any shadow price into a constraint.

The efficiency benefits and costs of this two-term objective function can be measured fairly well by the art of benefit-cost analysis in its present state. There are problems, to be sure, resulting from such factors as the collective character of the benefits of many public programs, the need to measure costs in terms of resource displacements rather than market prices where these two measures diverge, the selection of an appropriate discount rate, and various so-called external effects-but great progress has been made on these in recent years.² Thus, all that is needed to solve the maximization equation is to specify the tradeoff ratio between efficiency and income redistribution. If there is a way of finding this ratio, the maximization problem can be solved in any of its three forms, and we can design projects and programs that are responsive to a realistic two-factor objective function.

There is a way to determine the tradeoff-through the political process. For the federal government my studies indicate that there is a capacity in the legislative process to make the tradeoff decisions that can then govern the design of projects and programs. The President initiates the legislative process; the Congress examines the President's proposals in the light of alternatives and accepts, modifies, or rejects them. Thus, the experts in the executive departments need to develop data that show the effects on the design of programs and projects of different tradeoff ratios. This the executive can do. The President needs to select one or a range of these ratios and thereby initiate formally the legislative process. This the President can do. And finally, the Congress, when presented with such data and such a presidential initiative, needs to and can respond in order, as we shall see.

Ironically but understandably, the field of public investment for which the present benefit-cost technique is most advanced, water resources, is the field for which the political technique for determining tradeoffs among efficiency and other objectives is most primitive. The legislative process for water resources consists principally of omnibus bills that authorize individual projects, rather than of legislation that sets standards and criteria. In the housing and urban renewal area, by contrast, stan-

² For discussions of these problems as of 1961, see Marglin and Dorfman ([ref. 3] ch. 2, 3, and 4); also see [ref. 4]. For examples of more recent developments, see papers by Peter O. Steiner and Kenneth J. Arrow, in this volume.

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dards and criteria, based on both income redistribution and economic efficiency, are determined in the legislative process, and benefit-cost analysis is primitive.

The problem is to combine the advanced state of the art of efficiency benefit-cost analysis, as found in water resources planning, with an equally sophisticated technique for relating efficiency benefits and costs to those stemming from other objectives.

HAVE BENEFITS BEEN OVERESTIMATED?

In this context it is interesting to examine the arguments over so-called secondary benefits and how they should be included, if at all, in project analyses. There is no such thing as a secondary benefit. A secondary benefit, as the phrase has been used in the benefit-cost literature, is in fact a benefit in support of an objective other than efficiency.³ The word "benefit" (and the word "cost," too) has no meaning by itself, but only in association with an objective; there are efficiency benefits, income redistribution benefits, and others. Thus, if the objective function for a public program involves more than economic efficiency-and it will in most cases-there is no legitimate reason for holding that the efficiency benefits are primary and should be included in the benefit-cost analysis, whereas benefits in support of other objectives are secondary and should be mentioned, if at all, in separate subsidiary paragraphs of the survey report. Using the current language and current standards, most of the benefits to the Indians in the Indian irrigation project are secondary benefits. How silly!

In this context it is interesting also to examine the conclusion of many non-governmental studies of government planning for water resources projects, namely, that benefits have been overestimated. Hubert Marshall has recited the evidences of chronic overestimation in his paper, "Politics and Efficiency in Water Development," elsewhere in this book. **The** principal cause of such benefit "overestimation" is, I believe, the unreal restrictions placed on the analysis of projects by the unreal but virtual standard that the relation of efficiency benefits to efficiency costs is the indicator of a project's worth, when in fact the project is conceived and planned for objectives in addition to efficiency. In such an incongruous circumstance one might expect project planners to use a broad definition of efficiency benefits. The critics, either not understanding or unsympa-

³ The term has been used also to describe a small class of efficiency benefits that are *induced* rather than *produced* directly, by public investment, but the usefulness of this distinction is questionable.

thetic to the planners' plight, have judged them by a more rigorous definition of efficiency.⁴

HOW DID WE GET TO WHERE WE ARE?

Why has benefit-cost analysis developed in this way? Certainly not because of any myopia on the part of the Congress, though executive officers are frequently quick to blame Congress for their ills. To be sure, we do not have adequate legislative objectives, standards, or tradeoff ratios for the design and evaluation of water resources projects, but this is because the President has failed to initiate the legislative process, not because of a lack of receptivity to such initiatives by Congress. In fact, certain committees of Congress, impatient with the President for not proposing legislation to set standards, have tried to initiate the legislative process themselves; but without co-operation from the executive they have failed, understandably [ref. 3, p. 588]. The task of assembling and analyzing data, the necessary first step in the legislative process, is beyond the capacity of Congress and its staffs in complex areas like this one. Insofar as there is a general standard for the design of water projects that has been approved by Congress in legislation, it is a thirty-year-old statement that "the benefits to whomsoever they may accrue should exceed the costs."⁵ This standard, you will note, does not specify efficiency benefits, but "benefits to whomsoever they may accrue."

The executive agencies have painted themselves into the efficiency box. In 1950 the Subcommittee on Benefits and Costs of the Federal Inter-Agency River Basin Committee gave overwhelming emphasis to the efficiency ranking function in its now well-known "Green Book" report [ref. 5]. In 1952 the Bureau of the Budget, in a Budget Circular that neither required nor invited formal review and approval by the Congress, nailed this emphasis into national policy, adopting it as the standard by which the Bureau would review agency projects to determine their standing in the President's program [ref. 6]. And soon thereafter agency planning manuals were revised, where necessary, to reflect this Budget Circular. In this way benefits to all became virtually restricted to benefits that increase national product.

The federal bureaucrats, it should be noted, were not acting in a vacuum; they were reflecting the doctrines of the new welfare economics

⁴ Causes for so-called benefit overestimation, with the exception of the cause I consider to be the principal one, are given in Hubert Marshall's paper, in this volume.

⁵ Incidentally, this provision of the Flood Control Act of 1936 (49 Stat. 1570) did not originate in a presidential initiative.

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which has focused entirely on economic efficiency. Non-efficiency considerations have been held to be outside of the domain of the welfare economist. They have been called by such loaded names as “inefficient,” “value-laden,” “altruistic,” “merit-wants,” “uneconomical.”⁶

WHAT CHANGES IN WELFARE ECONOMICS THEORY ARE NEEDED?

From a practical point of view, the new welfare economics has dealt exclusively with efficiency because for it, and not for other objectives, benefit and cost data are provided automatically by the market, though market prices sometimes have to be doctored. Theoretically, however, the preoccupation of present-day welfare economics (and its branch of benefit-cost analysis) with economic efficiency results from its very basic assumptions, and two of these in my view can and should be abandoned.

First is indifference to the distribution of income generated by a government program or project—the assumption that each dollar of income from the program is of equal social value regardless of who receives it. In benefit-cost analysis that maximizes efficiency, an extra dollar to a Texas oil man is as desirable socially as one to an Arkansas tenant farmer, and an additional dollar of benefits for Appalachia, West Virginia, is no more worthwhile than one for Grosse Pointe, Michigan.

Few welfare economists support the social implications of this basic assumption, and they would compensate for them in one of two ways. Some hold that the professional planners should design projects and programs for economic efficiency, for which benefit-cost analysis can provide the necessary ranking function; and that thereafter these project designs can be doctored and modified by a political process to account for any “uneconomic” objectives.⁷ But this response is unsatisfactory for reasons already given. Where government programs are intended for complex objectives they should be designed, where this is possible, for such objectives, not designed for one objective, which may not be the most important, and subsequently modified in an effort to account for others. Almost inevitably economic efficiency will be overweighted in such a scheme. How relevant is this type of planning for our Indian irrigation project? Furthermore, such a planning process calls on political institutions to perform a task for which they are not well equipped.

⁶ For example, see Musgrave [ref. 7]. The first of these nomers is perhaps correct technically, but even this cannot be said of the others, for efficiency is not necessarily less or more value-laden, altruistic, or meritorious than other objectives:

⁷ In essence, this is what Dorfman proposes for West Pakistan [ref. 8].

Where the approval and modification of individual projects, rather than a debate on objectives and standards for designing projects in the first place, is the *principal* activity of the legislative process, decision making for the nation can disintegrate into project trading. In the legislature, for example, the voices of the whole house and of committees are muted at the expense of those of individual members, each making decisions for projects in his district and accepting reciprocally the decisions of his colleagues. Nor does the executive under these circumstances play a more general or high-minded role. The public investment decision process can be organized, hopefully, to play to the strengths rather than to the weaknesses of political institutions.

An alternative response of some welfare economists to the inequitable social consequences of the basic assumption of indifference to income distribution is as follows: It is more efficient to redistribute income directly from one group of individuals to another through government programs of taxation and subsidies, than to do so indirectly through government investment programs that are designed also to increase national product. If the government's objectives are, for example, to increase both national food production and income of the Indians, it should plan to accomplish these by two programs rather than a single one. Government planners should design the most efficient program for increasing food production, which may mean additional irrigation facilities in the Imperial Valley of California, where there are no Indians. Then, with taxes collected from the irrigators and representing their willingness to pay for their new benefits, the government should make subsidy payments to the Indians. In this way, so goes the argument, the government can achieve the best of both worlds. "Best" in this context means "efficient," however, and there is no reason why a community need prefer the most efficient method for redistributing income, especially if it requires transferring cash from one group to another. As Marglin points out in his treatment of this subject [ref. 3, pp. 17-18, 63-67], the means by which a desired distribution of income is achieved may be of great importance to the community.⁸ In our example, the

⁸ Tinbergen [ref. 9] observes that in the normal case, n programs (or instruments) are required to maximize a welfare function that includes n objectives (or targets). But for his normal case Tinbergen assumes that only the results of the programs, not their qualitative characteristics, affect welfare and that planners are free to select that level of achievement of each objective that maximizes the over-all welfare function. This freedom is theirs only if n programs are available to the planners. Our discussion, on the other hand, proceeds from the assumptions that the qualitative characteristics of the programs affect welfare, and that the number of acceptable programs may be fewer than the number of objectives, which necessitates the tradeoff among objectives. This would be an abnormal case in Tinbergen's formulation.

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community would probably be willing to give up some efficiency to see the living standard of the Indians improved by their own labors rather than by the dole. In short, the community may quite properly want to realize multiple purposes through public investment projects and programs, and if benefit-cost analysis is to be of great use in planning these activities, then the basic assumption of indifference to their distributive consequences must be abandoned.

It should be noted, however, that where, as in the case of the Indian irrigation project, a government program produces benefits that can be sold or otherwise charged for, a desired redistribution of income can be achieved by both the quantity of benefits produced and the prices charged for them. For any given quantity of irrigation water, the smaller the repayment required from the Indians, the greater the income they will receive. Thus, when the agency men prepare data showing the effects on public programs of alternative tradeoffs between economic efficiency and income redistribution, these alternatives should include different repayment possibilities.

The second basic assumption of the new welfare economics and of benefit-cost analysis that needs to be challenged is consumers' sovereignty—reliance solely on market-exhibited preferences of individuals. This assumption, to be sure, provides normative significance for the familiar prescriptions of welfare economics on which the efficiency calculus is based—for example, that price ought to equal marginal costs. Nonetheless, it is not relevant to all public investment decisions, for an individual's market preference is a response in terms of what he believes to be good for his own economic interest, not for the community.

Each individual plays a number of roles in his life—social science literature is filled with studies of role differentiation—and each role can lead him to a unique response to a given choice situation. Thus an individual has the capacity to respond in a given case, to formulate his preferences, in several ways, including these two: (1) what he believes to be good for himself—largely his economic self-interest, and (2) what he believes to be good for the political community. The difference between these two can be defined in terms of breadth of view. To the extent that an individual's response is community, rather than privately, oriented, it places greater emphasis on the individual's estimate of the consequences of his choice for the larger community.

Now, the response that an individual gives in any choice situation will depend in significant part on how the question is asked of him, and this means not simply the way a question is worded, but the total environment in which it is put and discussed. This can be illustrated with a small group experiment. Questions with relevance for the church (for example,

should birth control information be provided to married individuals who desire it?) were asked of Catholic students randomly divided into two groups. One group met in a small room where they were made aware of their common religious membership. The other group met in a large auditorium, along with hundreds of other students of many religions, where no effort was made to establish awareness of common religious beliefs. Although all of the students were instructed to respond with their “own personal opinions,” there was a significant difference between the replies of the group that were aware of their common religious membership and the unaware group, the former approximating more closely the orthodox Catholic position against birth control [ref. 10].

An individual’s response depends, then, on the institutional environment in which the question is asked. Since the relevant response for public investment analysis is community, not privately, oriented, the great challenge for welfare economics is to frame questions in such a way as to elicit from individuals community-oriented answers. The market is an institution designed to elicit privately oriented responses from individuals and to relate these responses to each other. For the federal government, the electoral, legislative, and administrative processes together constitute the institution designed to elicit community-oriented responses. The Maass-Cooper model describes these processes within such a context [ref. 3, p. 588].

Although several welfare economists have recognized explicitly that individuals play several roles and that these roles influence preferences, they go on to say that in making decisions relating to social welfare each individual uses a composite utility function, a total net position representing a balance of all of his roles [ref. 11, 12, 13]. This last hypothesis, which is not supported by experimental evidence, is unfortunate. It misses the point that an individual will respond differently depending on how the question is asked of him, and it fails to give proper emphasis to the differentiation of institutions for putting the question—for example, the market institution to elicit privately oriented responses, and political institutions for those that are community oriented.

Ideally, we want community, not market, responses of individuals with respect to both factors in our complex objective function—economic efficiency and income redistribution. Fortunately, however, market-determined prices are a fairly good surrogate for the economic efficiency factor, providing adjustments are made for so-called externalities and the like.⁹ This is opportune. Were it not for the propriety of using market-related prices for efficiency benefits and costs, benefit-cost analysis for

⁹ Marglin’s 1962 analysis [ref. 3] is one demonstration of this.

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public projects and programs would be beyond the capacity of available economic techniques and of political institutions as they operate today.

Some day, I am confident, we shall be able to use institutions that elicit community-oriented responses to measure all factors in a complex objective function—efficiency, income redistribution, and others. The very recent search by a few economists, inspired largely by the work of Kenneth Arrow, for a new criterion of social welfare may contribute to this end.¹⁰ The more modest proposal of this paper is that we use political institutions to measure the tradeoff ratio between a basically market-determined efficiency and the single most important non-efficiency objective of a government program—which is likely to be income redistribution but may be some other.

WHAT IS THE EVIDENCE THAT TRADEOFFS CAN BE DETERMINED?

It remains to be demonstrated that there is a capacity in the legislative process to select tradeoff ratios in a way that will be useful for the design of government programs and projects. As stated earlier, the legislative process involves three steps. First, the officials in the executive departments prepare data showing what would be the effects on programs and projects of alternative tradeoffs between economic efficiency and another objective; second, the President, with these data in hand, selects a tradeoff ratio and proposes it to Congress as the legislative standard; and third, Congress examines the President's proposal, in the light of the alternatives developed in the departments and of others that may come from outside sources, and accepts, rejects, or modifies it.

The first step should not involve great difficulties, especially in water resources where analysis of the efficiency factor is well advanced, although there will be obvious problems in areas where economic efficiency analysis is primitive. For continuing programs, the data necessary to initiate the legislative process need not relate to projects and programs being designed or to be designed; they can be drawn from projects already in operation and in some cases from hypothetical or prototype projects. Agency men can reexamine completed projects and programs and estimate how differently they would have been built and would have operated with different tradeoffs among objectives. At the same time they can reflect in the data that they prepare for new investment programs information generated during previous planning periods, thereby using a sequential planning process. (See Marglin [ref. 14, p. 22].)

¹⁰ For an excellent summary of this research, see Rothenberg [ref. 13].

It is at the final, or congressional, stage that doubters will raise most questions, and it is, of course, this stage that is most difficult to prove, because in the water resources area, for which the legislative initiative could be taken most clearly, the President has failed to act. To demonstrate Congress' capacity we must, therefore, turn to public investment programs for which standards have been set in legislation, and these are ones for which benefit-cost analysis is so rudimentary that it is necessary to examine the record very carefully for implicit evidence of a concern for tradeoffs between efficiency and other objectives.

Legislation authorizing the National System of Interstate Highways, principally the Act of 1956, furnishes one example.¹¹ The legislation provides that the system should consist of 41,000 miles of roads which are identified generally as to location, and it sets design criteria for these roads. The criteria depart from those of earlier highway legislation in three important respects, apart from the taxing methods for financing the federal government's share of the costs. First, roads are to be designed for predicted traffic volumes of 1975, and the monetary authorizations are calculated from this standard.¹² Second, the federal-state matching ratio is changed from 50: 50 to 90: 10. Third, the formula for apportioning funds among the states is changed. The earlier formula for the primary system of roads was one-third on the basis of each of the following ratios: a state's population to the total U.S. population, a state's area to the total U.S. land area, a state's rural delivery and star routes to the total U.S. mileage of such roads. The new formula provides a single ratio—the estimated cost of completing the interstate system within the borders of a state to the total estimated cost of completing the entire system by a fixed date, 1972.¹³ This last criterion was agreed to after considerable discussion involving numerous alternatives, but principally two: the one adopted and one that would continue to give considerable weight to a state's area and its population.

As Major has shown, these alternatives represent respectively economic efficiency, or more properly a surrogate for efficiency, and income redistribution. Given the requirement of completing a given mileage, by a given date, to a given capacity (1975 traffic volume), an apportionment based on cost of completion would be efficient; and one based on such factors as a state's area would introduce other objectives into the pro-

¹¹ My data are taken from Major [ref. 15]. See this thesis for citations of statutes and reports referred to here.

¹² This design standard was amended in 1963 to provide for predicted traffic volumes twenty years from date of approval of project plans.

¹³ The Act of 1956 contemplated completion by fiscal year 1969, but both estimated costs and year of completion were later amended.

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gram, namely, redistribution of income (largely federal construction funds) to rural states where traffic volumes and highway construction costs per mile are typically lower. This is especially true because the alternative provided that if a state received more funds than necessary to complete its portion of the interstate system, it could divert a percentage of the excess for use on its other federally aided roads.

A study of the legislative process in which these new program criteria, especially the third one, were adopted has some useful lessons for our inquiry. There was a vigorous and effective executive initiative of the process. The concept of uniform completion of an interstate system in all states at approximately the same time appears to have been recommended first by a non-federal entity, the American Association of State Highway Officials. Thereafter, the Bureau of Public Roads made a detailed factual study of the costs of building an interstate system. The President, in an address before the 1954 Governors' Conference, proposed that the nation develop a new master plan for highways, and he appointed an Advisory Committee on a National Highway Program, chaired by General Lucius Clay, to prepare one. The Clay Committee used the Bureau of Public Roads report as its empirical base. It recommended the three design standards that were finally adopted, presenting them in the context of alternatives about which debate in the legislative process could and did revolve.¹⁴ Both the BPR and the Clay reports were sent to the Congress, along with a presidential recommendation. The discussion in Congress, in committee and on the floor, was informed and extensive. Information was available on the expected consequences in terms of investment of choosing alternative standards, the participants were aware of the nature of the choices they had to make, and their debate was rich in relevant arguments pro and con on the alternatives, especially on apportionment formulae.

What we have called economic efficiency in this case-i.e., the **most** efficient way of satisfying a fixed requirement-is of course quite different from economic efficiency as an objective in benefit-cost analysis for water resources, where it means to maximize the contribution of a **project** to national product. The latter concept played no part in setting the standards for the highway program. The art of efficiency benefit-cost analysis is much less well developed for public investments in highways than in water resources developments, and this was even more true ten years ago than it is today. It is not unreasonable to suggest, from the record of the legislative process **for** the interstate highway system, that

¹⁴ The Clay report's proposals on tax policy and accounting procedures for financing the road system, which we do not discuss here, were altered significantly in the legislative process.

had data been available on real economic efficiency and on alternative tradeoffs between it and income redistribution, these would have been used intelligently in setting standards.

Comparing the legislative processes for the interstate highway system and water resources, the former is less concerned with authorizing individual projects that have been designed and more concerned with setting standards for project design. To be sure, the Highway Act authorized 41,000 miles of roads and fixed their general locations. Design of the roads, including definite locations for them, was left, however, for administrative action insofar as the federal government was concerned.

In federal programs for housing and urban renewal, standards and design criteria have been set in the legislative process, and the recent legislative history of the rent supplement program is an instructive example.¹⁵ In his Housing Message of 1965, President Johnson described a proposed program for rent supplement payments as "the most crucial new instrument in our effort to improve the American city." The federal government was to guarantee to certain private builders the payment of a significant part of the rent for housing units built for occupancy by moderate-income families. These are families with incomes below the level necessary to obtain standard housing at area market prices, but above the level required for admission to publicly owned low-rent housing units. The rent payments were to be the difference between 20 per cent of a family's income (the proportion of income that a moderate-income family is expected to allocate to housing) and the fair market rental of the standard housing to be built. The President proposed an authorization of \$200 million over four years which was designed to encourage the construction of 500,000 new housing units in this period. The housing supported in this way would constitute some but not all of the rental units in new housing projects.

The Housing Act of 1961 had also included a program designed specifically for moderate-income families, but this program had encountered certain problems that slowed its expected impact. Section 221(d)(3) of the 1961 Act provided for 100 per cent loans to qualified private builders at below-market interest rates. The low interest rates were to keep rents within the reach of moderate-income families. The law provided, however, that the interest rate was to be the average rate on all outstanding marketable federal obligations. This was $\frac{3}{8}$ per cent when the program began, but it had risen to approximately $\frac{4}{8}$ per cent by

¹⁵ Except where otherwise noted, the facts of this case are derived from legislative documents relating to the Housing and Urban Development Act of 1965 [ref. 16]. David C. Major has assisted in developing the facts and interpretation of this case.

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mid-1965. This meant that rents would be significantly higher and beyond the capacity of most moderate-income families. Another problem with the 1961 program was that the low interest mortgages constituted a heavy drain on the special assistance funds of the Federal National Mortgage Association, the federal housing credit agency that purchased them. Because these mortgages were below market rates, FNMA could not issue against them debentures for sale in private capital markets, and they remained a 100 per cent charge on federal funds. Nonetheless, the Administration recommended in 1965 that the 221d(3) program be continued for four years with a mortgage authorization of \$1.5 billion, for about 125,000 new housing units. But this program was to be phased out if the rent supplement proposal worked as its backers hoped that it would.

The Administration had three principal objectives in proposing rent supplements. The first was to increase the number of housing starts. This derived from a desire to expand the national housing stock and a concern about the possibly failing health of the housing industry and the industry's impact on the national economy. We can equate this objective roughly with increasing national product, or economic efficiency. The government's housing experts found that there was a large untapped market for new housing among moderate-income families, and that rent supplements for them would stimulate the rapid construction of substantial amounts of new housing.

The second principal objective of the Administration in recommending a rent supplement program was to give direct assistance to a large group of families with incomes above the public housing level but below the level needed to obtain standard housing at market prices. This objective we can equate with income redistribution-to moderate-income families.

As for direct assistance to low-income families, the Administration bill would authorize additional public housing units. Over a four-year period 140,000 new units were to be built and 100,000 units purchased or leased from private owners and rehabilitated. Using the trickle-down theory, the Administration could claim that all other housing programs that increased the national stock of standard housing would ultimately improve the housing of the poor, but certainly the primary and direct impact of the rent supplement program, insofar as its objective was income redistribution, favored moderate-income families.

The Administration's rent supplement program contained, then, as one design criterion of a tradeoff ratio, relating the objectives of efficiency and income redistribution, and as a second, a specification of the group to be favored by the redistribution. The second criterion was explicit in

the Administration's legislative initiative, though the first was largely implicit.

The Administration's third principal objective for the rent supplement program was "economic integration." Families being aided by the government would live in projects with families who would pay normal market rentals for their housing. In this respect the new program differed from most other federal housing programs for disadvantaged groups, for the latter promoted economic segregation. Only the poor live in public housing; all units in 22 Id(3) projects are for occupancy by designated groups. To encourage economic integration even where local authorities may oppose it, the Administration proposed that in certain cases projects supported by rent supplements need not conform to locally approved "workable programs" for housing development.

After hearings, and debates, and conferences, Congress modified drastically the Administration's design criteria for a rent supplement program. Briefly, the supplements are to be given for new standard housing units that are to be occupied by low-income families. As a result, both the tradeoff ratio between efficiency and income redistribution and the impact of the redistribution itself have been changed.

The relative contributions of the program to increasing national product and to redistributing income have been altered because, with a given authorization or appropriation, there will be fewer housing starts if rents of low, rather than moderate, income families are supplemented. The unit costs of standard housing are the same in either case, but the supplement required to make up the difference between what the family can pay and what is needed to support the new housing varies greatly. The new law authorizes \$150 million for rent supplements (rather than the \$200 million proposed by the President). According to December 1965 estimates of housing experts, this \$150 million would result in 350,000-375,000 housing starts over four years if it were available for the Administration's program of aiding moderate-income families. As rent supplements for low-income families, the same money will induce only 250,000-300,000 starts.¹⁶

As for the criterion that governs the group to be benefited, the relative impacts on low- and moderate-income families of the original and revised programs for rent supplements and closely related activities are shown in Table 1.

¹⁶ Under the Administration bill the rent supplement would be the difference between rent for standard housing and 20 per cent of a moderate-income family's income; under the Act as approved, the difference between the same rent and 25 per cent of a *low-income* family's income. The two changes made by Congress work in opposite directions, but they do not offset each other.

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TABLE 1.
Impact on **Low-** and Moderate-Income Families of Certain Provisions of
1965 Housing Act

Program	Administration proposal	Congressional action
(All figures are thousands of housing units over four years)		
Low income		
Public housing	240	240
Trickle down from all programs that increase national stock of standard housing	ok	ok
Rent supplement program	zero	250-300
Moderate income		
Rent supplements	467-500	zero
221d(3)	125 (<i>but problems in achieving this because of high interest rate and drain on FNMA funds</i>)	125 (<i>and this likely to be achieved because interest rate fixed at 3 % and provision made for tapping private capital</i>)

The impact of Congress' revisions on the Administration's third objective of economic integration is not so clear. Insofar as it is poor rather than moderate-income families who are enabled to live in housing developments along with families that are able to pay normal rents, a more dramatic integration can be achieved. On the other hand, it is clear from the legislative history that Congress does not intend that the housing agency exempt any rent supplement projects from the "workable plan" requirement, which means that local controls will continue.

The housing case study, like that of the highway program, shows that there is a capacity in the legislative process to discuss and adopt Standards and criteria to control the design of public projects and programs; that the Congress is prepared to focus its efforts on such standards and forego authorization of the projects themselves-public works for housing, urban renewal, and community facilities are not individually authorized by law; and that the legislative process for setting standards can be used to select tradeoff ratios where a program has two objectives. On this latter point, the rent supplement case is a bit weak, to be sure. The Administration in its legislative initiative did not make sufficiently explicit the tradeoff between economic efficiency and income redistribution that was involved in its proposal for approximately 500,000 new housing starts for the benefit of moderate-income families. Administration witnesses failed to give a clear statement of how the two objectives were related and how the program would differ if alternative tradeoff ratios were assumed. One reason for this failure is that efficiency benefit-cost analysis has not been perfected for housing programs as it has for

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water resources. Nonetheless, the Congress, in reviewing the President's program, managed to focus on the relevant design criteria and, after extensive consideration, including some confused debate, revised them in a way that apparently was consistent with its policy preferences. Also, the executive now has a legislated standard that it can use in redesigning the relevant housing programs. How much better the process would have been if the initiative had been better prepared!

THE LESSON

To those in the executive departments of the U.S. government, the lessons of this article should be clear. If the subject is water resources, initiate a legislative proposal for setting a tradeoff value between economic efficiency and the most important non-efficiency objective that is relevant to your agency's program. Once this is approved, you can forget about secondary benefits, probably be relieved from the drum-drum and profession-wise insulting charges that you persistently overestimate benefits, and you can design projects that are more in accord with the nation's objectives. If the subject is highways, or housing, or most other public investment programs, perfect the efficiency benefit-cost technique for your agency's program. Once this is done, there should be no difficulty in deriving through the legislative process a tradeoff between efficiency and another objective. As a result, the design and selection of projects will be more intelligent and the program should be more convincing to those who judge it.

After the agencies have learned how to work with two-term objective functions, they can try to solve far more complex ones. For the time being, however, purposes other than efficiency and the most important non-efficiency objective will need to be treated descriptively in the familiar "additional paragraphs" of program and project reports.

REFERENCES

- [1] Dorfman, Robert (ed.). *Measuring Benefits of Government Investments*. Washington: Brookings Institution, 1965.
- [2] Mera, Koichi. "Efficiency and Equalization in Interregional Economic Development." Ph.D. thesis, Harvard University, 1965.
- [3] Maass, Arthur, Hufschmidt, Maynard M., Dorfman, Robert, Thomas, Harold A., Jr., Marglin, Stephen A., and Fair, Gordon Maskew. *Design of Water-Resource Systems*. Cambridge : Harvard University Press, 1962.

BENEFIT-COST ANALYSIS

- [4] Hufschmidt, Maynard M., **Krutilla**, John, and Margolis, Julius, with assistance of Marglin, Stephen A. *Standards and Criteria for Formulating and Evaluating Federal Water Resources Development: A Report of Panel of Consultants to the Bureau of the Budget*. Washington: U.S. Government Printing Office, 1961.
- [5] U.S. Federal Inter-Agency River Basin Committee, Subcommittee on Benefits and Costs. *Proposed Practices for Economic Analysis of River Basin Projects*. Washington, May 1950.
- [6] U.S. Bureau of the Budget. *Circular A-47* (Mimeo.). Washington, December 31, 1952.
- [7] Musgrave, Richard A. *The Theory of Public Finance*. New York: McGraw-Hill, 1959.
- [8] Dorfman, Robert. "An Economic Strategy for West Pakistan,*" *Asian Survey*, Vol. 3 (1963).
- [9] Tinbergen, Jan. *On the Theory of Economic Policy*. Amsterdam: North-Holland Publishing Co., 1952.
- [10] Charters, W. W., Jr., and **Newcomb**, Theodore M. "Some Attitudinal Effects of Experimentally Increased Salience of a Membership Group," in Maccoby, Eleanor E., **Newcomb**, Theodore M., and **Hartley**, Eugene L. *Readings in Social Psychology*. New York: Henry Holt, 1958.
- [11] Downs, Anthony. "The Public Interest: Its Meaning in a Democracy," *Social Research*, Vol. 29 (1962).
- [12] Colm, Gerhard. "The Public Interest: Essential Key to Public Policy," in Friedrich, C. J. (ed.), *The Public Interest*. New York: Atherton Press, 1962, p. 121.
- [13] Rothenberg, Jerome. *The Measurement of Social Welfare*. Englewood Cliffs, N.J.: Prentice-Hall, 1961, pp. 296-97.
- [14] Marglin, Stephen A. *Public Investment Criteria*. London: Allen and Unwin, 1966.
- [15] Major, David C. "Decision Making for Public Investment in Water Resource Development in the United States." Ph.D. thesis Harvard University, chap. 5.
- [16] President's Message (H. Doc. 89-99) ; Hearings before Subcommittees on Housing of the House and Senate Committees on Banking and Currency (March-April 1965) ; Reports of House and Senate Committees on Banking and Currency (H. Rept. 89-365, S. Rept. 89-378) ; Debate in House and Senate (*Congressional Record* for June 28-30 and July 14-15, 1965); Conference Report (H. Rept. 89-679); Debate in House and Senate on adoption of Conference Report (*Congressional Record* for July 26-27, 1965).